

SD 11
A-523
#48

STATION NOTES

CENTRAL STATES FOREST EXPERIMENT STATION
COLUMBUS 15, OHIO

No. 48



December 1948

DOT-TYPE SCALE FOR MEASURING TREE-CROWN DIAMETERS ON AERIAL PHOTOGRAPHS

The gross volume of timber stands can be estimated from aerial photographs by measuring crown diameter, tree height, and crown density. The crown wedge (fig. 1) is commonly used to measure crown diameter. The wedge, etched on transparent material, is moved over the photographic image of the tree crown to be measured until the edges of the crown just touch the converging lines of the wedge. At this point the scale on the lower wedge line is read to determine the crown diameter on the photograph in hundredths of an inch. The actual diameter of the tree crown can then be determined by reference to conversion tables (table 1).

As the wedge lines converge, the crown perimeters on the photograph blend with them making measurement difficult, and actually impossible where the wedge lines appear to consolidate for a short distance before they converge. Increased accuracy at the narrow end of the wedge is important where aerial photographs have a scale of approximately 1:20,000. At this scale even the images of large crowns appear as very small dots and must be measured at the small end of the wedge. Use of the wedge to measure crowns of irregular shape is particularly difficult. The crown diameter must be measured from several directions and averaged to obtain a reading that is representative of the area of the jagged image presented. Furthermore, some interpreters have difficulty in learning to use the wedge.

To overcome some of these disadvantages, the dot-type crown scale was devised (fig. 2). It allows side-by-side comparison of the dots of different sizes with the photographic image of the crown whose diameter is to be determined. No complicating wedge lines are involved. Very small crowns are readily measured. Visual comparison of crown area, regardless of shape, with a dot seems to be a relatively simple and accurate operation.

The consistency of readings made with the dot-type crown scale was compared with that of the wedge. Three interpreters used the dot-type scale to determine average crown size of trees on each of 168 saw-timber plots which had previously been measured by three interpreters applying the crown wedge. The consistency of reading proved slightly greater for the dot-scale than for the wedge. The dot-type scale is therefore recommended in preference to the crown wedge, where small-scale photographs are used.

Chester E. Jensen, Forester
Central States Forest Experiment Station

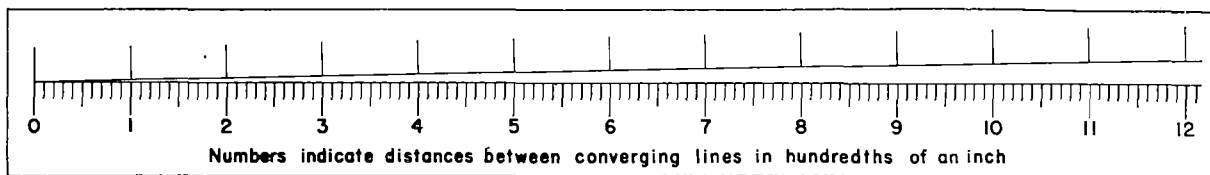


Fig. 1.--Crown wedge

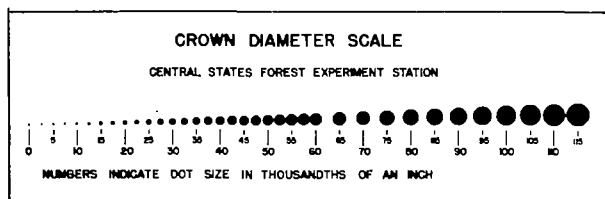


Fig. 2.--Dot-type crown scale

Table 1.--Actual crown width for various photo-crown widths and photo scales

| Photo Crown : Width : 1:18,000 | 1:19,000 | 1:20,000 | 1:21,000 | 1:22,000 |
|-----------------------------------|----------|----------|----------|----------|
| Thousandths of an inch | Feet | Feet | Feet | Feet |
| 2.5 | 4 | 4 | 4 | 5 |
| 5.0 | 7 | 8 | 8 | 9 |
| 7.5 | 11 | 12 | 13 | 14 |
| 10.0 | 15 | 16 | 17 | 18 |
| 12.5 | 19 | 20 | 21 | 23 |
| 15.0 | 22 | 24 | 25 | 27 |
| 17.5 | 26 | 28 | 29 | 32 |
| 20.0 | 30 | 32 | 33 | 37 |
| 22.5 | 34 | 36 | 37 | 41 |
| 25.0 | 37 | 40 | 42 | 46 |
| 27.5 | 41 | 44 | 46 | 50 |
| 30.0 | 45 | 47 | 50 | 55 |

The crown-width conversion table can be readily computed for use with photos of a scale other than those given above.